

CONFIRMED MINUTES

IHRA SIDE IMPACT WORKING GROUP

4th MEETING

KYOTO, JAPAN

17-18 MAY 1999

ATTENDEES

Keith Seyer	Federal Office of Road Safety, Australia (Chair)
Craig Newland	Federal Office of Road Safety, Australia (Secretary)
Dainius Dalmotas	Transport Canada
Richard Lowne	EC/EEVC
Joseph Kianianthra	National Highway Traffic Safety Administration, USA
Robert Hultman	AAM/OICA
Falk Zeidler	ACEA/OICA
Takahiko Uchimura	JAMA/OICA/Japanese Ministry of Transport/JASIC
Hideki Yonezawa	Japanese Ministry of Transport
Marc Beutenberg	WorldSID Task Group and Design Team
Haruo Ohmae	JARI
Toru Kiuchi	OICA/Toyota (observer)
Kenichi Ando	OSA (observer)

APOLOGIES

Apologies were received from Per Lovsund, Risa Scherer (proxy - Marc Beutenberg) and Rainer Justen (proxy – Falk Zeidler).

MODIFICATIONS TO AGENDA

A presentation on the ACEA view of harmonisation was included under item 7.

A presentation from Transport Canada to present a summary of global crash statistics was added under item 8.

Discussion on the Test Procedure Strawman previously presented by Mr Hultman was added as item 10a.

The revised agenda is referenced as Document SIWG 30.

IHRA WEBSITE ISSUES

Mr Kianianthra raised the issue of the IHRA website and the difficulties of protecting information. There was a degree of concern regarding the provision of sensitive information to IHRA, particularly if it could be accessed through different avenues, including legal avenues in various countries. Mr Kianianthra suggested that the possibilities for information protection should be investigated and that it

may be desirable to set up a website offshore from the USA. NHTSA were unsure of their ability to protect information on their website from "Freedom of Information" access from persons outside the IHRA group.

MINUTES OF THE PREVIOUS MEETING

The draft minutes of the third meeting, held in London were amended, approved and confirmed (refer Document SIWG 29).

WORLD SID TASK GROUP UPDATE

Mr Seyer described an oral presentation he gave to the WorldSID task group at their meeting held last week. He had noted the results of accident studies indicating the frequency and severity of narrow object and vehicle-vehicle crashes. The head and thorax were the most frequently injured body regions. There was a consensus that the test procedure would include a MDB to vehicle test, a vehicle to pole test and out-of-position tests. The dummy size and placement issues were yet to be finalised, but there was broad agreement for a 50th percentile male and 5th percentile female WorldSID. MDB parameters were also to be investigated, with the first steps taken by Australia and Transport Canada in their bilateral test matrix.

Mr Beusenbergh presented an update on the activities of the WorldSID Task Group. There had been a reconfirmation of selected concepts for WorldSID components. The design team has been preselected but is not yet operational (contracts are pending).

The design team is:

First Technology Safety Systems	Half (stub) arm, lumbar spine, clothing
SID2000 Consortium (TNO/TRL/INRETS)	Head, neck, pelvis
Denton	Full arms, upper legs, load cells
GESAC/ASTC	Lower legs
Diversified Technical Systems	In-dummy data acquisition system
Endevco	Accelerometers

The shoulder/thorax/abdomen was seen as one task. There has been no final selection to date. FTSS and SID 2000 have both been subcontracted to further develop their concepts for selection.

Deflection measurements are the responsibility of the component designers.

Decisions regarding this will not be made by the WorldSID Task Group.

Biokinetics are to ensure assembly and TC the certification of the dummy.

As previously advised at 3rd IHRA Side Impact Working Group meeting, the original WorldSID program has been extended by 6 months.

The WorldSID Task Group has reviewed and updated the dummy specifications, with a few additions and no major deletions. An updated copy of the specification

to be sent to Mr Newland for circulation to the group for comment (Document SIWG 32).

The WorldSID Design Team will indicate to the WorldSID Task Group the level to which the specification can be met, given timing, budget and technology constraints.

Mr Kianianthra asked if the WorldSID would be designed to correctly interact with airbag sensor systems, particularly with regard to airbag disable functions. Mr Beusenberg replied that the dummy should meet these criteria as they were in the specification. The specification is to be finalised by June 1999, with IHRA input requested prior to this time.

The development timeline document (Document SIWG 31) currently shows development for 2 dummies: a 50th percentile adult male and a 5th percentile female. Size information is urgently required from IHRA.

Evaluation of the α -prototype will focus on biofidelity and functionality, with calibration specifications to be determined. The β -prototype will be available for purchase, and also distributed around the world for evaluation. Document SIWG 33 was tabled as the evaluation test matrix for β -prototype WorldSID.

Mr Beusenberg suggested to use the WorldSID website to list future meeting dates (including IHRA) to enable smoother scheduling for Side Impact development. The next WorldSID meeting is scheduled for 13-14 July 1999 in Cologne, Germany.

IHRA BIOMECHANICS WORKING GROUP UPDATE

Mr Seyer summarised the activities of the previous meeting of the IHRA Biomechanics Working Group.

Mr Eppinger spoke to the group and noted that there were 4 topics to be addressed: anthropometry, crash data analysis, injury criteria and WorldSID liaison, with a report due by the end of November 1999.

The group was reminded that it was an ad-hoc side impact group with a terms of reference and needed to finalise the anthropometric information as soon as possible for the WorldSID task group.

At the IHRA Biomechanics meeting, Mr Newland presented a summary of anthropometric data obtained by searching the literature and requested guidance on the direction in which to proceed. It was decided that it would be appropriate to use the data from UMTRI (Schneider et al) as it was the most detailed information for automotive seating posture, but that this data should be scaled using the information from Jurgens to reflect "world" population. Mr Cesari also reported on injury assessment methods and thresholds.

Mr Newland presented the anthropometric information to the IHRA Side Impact Working Group (Document SIWG 34).

TIMELINES: WorldSID, IHRA Biomechanics and IHRA Side Impact

A project Gantt chart for WorldSID development was tabled by Mr Beusenberg (Document SIWG31). This plan was developed with input from the ISO WorldSID Task Group, IHRA Biomechanics and Side Impact Working Groups. In order for the WorldSID program to proceed as scheduled, timely inputs are required from both the IHRA Biomechanics and Side Impact Working Groups.

Mr Lowne asked if the dummy would be modified if required by the IHRA Side Impact test procedure. Mr Beusenberg replied in the affirmative, that the dummy must work for the test.

Mr Seyer noted that the WorldSID information requirements covered all MDB issues raised in a previous discussion paper from Mr Seyer to the IHRA Side Impact Working Group. He posed the question as to whether there may be other test procedure requirements not covered.

Mr Lowne noted that the issue of hidden load paths was recently included into the specification, and was keen to know how “missing” data might be addressed.

Mr Beusenberg indicated that the sizes and moments of inertia of body parts would need to be correct and then simulations could be used to help with hidden load paths. Mr Beusenberg admitted a likely need to approach some of the requirements using data from similar or related tests (for example leg airbag deployments on volunteers at UMTRI may be used to indicate initial stiffness of arms).

Mr Lowne stated that there would be a need to identify critical areas of missing data and to conduct further research work to collect appropriate data.

Furthermore, it is the role of IHRA to coordinate this work.

Mr Seyer pointed out that according to the WorldSID timeline chart, the IHRA Side Impact Working Group would need to use a prototype version of WorldSID to evaluate any test procedures. It would not be practical to wait for a production version of WorldSID to conduct evaluations of test procedures.

Dr Zeidler expressed concern over the length of time for a harmonised regulation (too long-term). He asked about the goals for short-term harmonisation.

Mr Kianianthra, Mr Seyer and Mr Lowne replied that the IHRA mandate finishes at ESV 2001 with reports due by this time. Countries would then evaluate and possibly adopt regulations. IHRA was not concentrating on short-term harmonisation.

Mr Kianianthra also stated that IHRA is only for research and not necessarily regulation. In addition, harmonisation does not require that all countries set exactly the same test requirements and that test requirements would depend on the acceptable risk willing to be tolerated by individual countries.

Mr Seyer summed up by saying that at this stage we would need broad commitment to the WorldSID timeline. Anthropometry should be finalised by the next IHRA Biomechanics meeting in Cologne, as should the outline of the test procedure by the IHRA Side Impact Working Group.

DAIMLER CHRYSLER BASELINE ON SI HARMONISATION

Dr Zeidler delivered a brief presentation expressing concern over the lack of short-term harmonisation (Document SIWG 35). He proposed the interim use of either FMVSS214 or ECE R95. An improved EuroSID-1 should be used in ECE R95, with WorldSID to be used in the long-term.

The use of both an MDB test and a pole test was proposed, based on the philosophy that two different tests would be better than two similar tests (such as FMVSS 214 and ECE R95).

The proposal included a statement that the current most stringent pole and MDB requirements would be accepted for harmonised regulations.

Mr Seyer asked if this was the view of ACEA or OICA.

Mr Kianthra reiterated that harmonisation does not require that all countries set exactly the same test requirements and that test requirements would depend on the acceptable risk willing to be tolerated by individual countries. Thus the levels of stringency of test requirements could be different in different countries.

The ACEA view was rephrased to state that the procedure should be the same, but that they would agree to different thresholds for injury.

Mr Seyer made the point that it was too early to attempt to resolve this issue due to a lack of scientific evidence. This discussion should be held after some progress.

DRAFT TERMS OF REFERENCE - FEEDBACK FROM IHRA STEERING COMMITTEE

None of the delegates were aware of any comments from the Steering Committee regarding the IHRA Side Impact Working Group terms of reference. It was assumed that no news is good news and that work should continue as planned.

PRESENTATIONS OF ACCIDENT STUDIES

AUSTRALIA

Mr Newland presented results from Australian fatal crashes (Document SIWG 36).

JAPAN

Mr Uchimura presented an Overview of Side Impact Accidents in Japan (Document SIWG 37).

EEVC

Mr Lowne provided EuroNCAP results for the Fiat Punto (Document SIWG 38). The pubic symphysis peak force was not available as the load cell failed during the test. There was no in-depth data on the field performance of Fiat Punto in side impact crashes.

CANADA

Mr Dalmotas presented a global overview of crash data (Document SIWG 39). It was found that side impact crashes are the second most common crash mode for serious and fatal injuries. Approximately 25% of all collision injuries of MAIS 3+

result from side impact crashes. Of these injuries, 70% are to struck side occupants and 30% non-struck side occupants.

Mr Lowne commented that it was necessary to clearly distinguish between injuries to the pelvis, femur, tibia, ankle and foot because the term "lower extremity" is too broad.

Mr Dalmotas further noted that pole impacts predominantly involved young male occupants (less than 30 years old) and therefore proposed that pole tests should be conducted using a 50th percentile male dummy. Mr Dalmotas also posed the question of whether IHRA needs to consider non-struck side occupants, based on the considerable cost savings to be made according to HARM analysis.

Mr Dalmotas then proposed that representative test conditions could be a 50th percentile male with the seat in mid-position for a pole impact; and an MPV-like MDB to vehicle test using 5th percentile female occupant(s).

The chairman summarised this presentation by noting that females featured highly in vehicle to vehicle collisions and that 30 year old males featured highly in pole impacts. This would suggest the use of a pole test and an MDB test. The head and thorax were the two most highly injured regions.

Mr Zeidler stated that Europe has smaller, more aggressive cars that may not be best represented by an MPV-like MDB. In addition, he was not aware of any European evidence for injury to non-struck side occupants.

Mr Seyer asked the members if there was an intention to require a non-struck side test.

There was a consensus to hierarchically list test procedures considered relevant (including non-struck side testing as appropriate) and then allow regulatory bodies to take up the number of tests considered important for an individual country.

Mr Lowne was not convinced of the need for a 5th percentile female dummy. It was pointed out that the global crash data indicates females are an ever-increasing percentage of fatalities and to cover this scenario we need to have available a 5th percentile female WorldSID. Mr Lowne conceded that we need to evolve a test procedure to provide adequate protection for the small female population because the crash data shows it is significant.

DISCUSSION OF VEHICLE DESIGN CHANGES RESULTING FROM SIDE IMPACT REGULATION

EEVC

Mr Lowne reported that EuroNCAP do not have photographs of door interiors, but there are video records of door teardowns. He commented that it may be possible to obtain photographs from consumer tests.

Mr Lowne also noted that the use of pusher blocks seems to be declining as side airbag use increases. He then inquired why we were looking at this issue. Mr Dalmotas and Mr Seyer replied that it would be useful information to assess the possible different countermeasures used for ECE R95 and FMVSS 214 and would be a means of learning about design methods for side impact protection.

Mr Kianianthra pointed out that additions to vehicles are not simply for side impact protection, but for frontal protection and other reasons too. It was agreed to keep looking for this type of information and to discuss further at the next meeting. It would then be decided if this issue should be pursued.

GEOMETRIC STUDIES OF THE FLEET

Mr Newland presented geometric data from a range of Australian vehicles (an expansion of Document SIWG 20). This showed the height mismatch of the front longitudinals of a vehicle with the side structure (sill).

Japan agreed to undertake a similar survey and present the results to the group at the next meeting.

DISCUSSION OF THE TEST STRAWMAN AS THE BASIS FOR A TEST PROCEDURE

Mr Hultman noted an amendment to the original proposal (Document SIWG 18) in that the pole height specified at slide 9 should extend above the roof structure. Each slide was discussed and the following was agreed:

- Slide 1 :- amended to delete everything except the title "Test Procedure Strawman for Research Test Matrix"
- Slide 2 :- Agreed. No change.
- Slide 3 :- Agreed. No change.
- Slide 4 :- Mr Kianianthra asked why the driver was not specified as a 5th percentile female. Transport Canada expressed a desire to use 5th percentile female in both the driver and rear passenger positions. Mr Seyer suggested that these issues could be resolved by consideration of 'worst case'. Mr Lowne indicated that this choice would depend on the outcome of optimisation. He stated that Europe would only accept 2 tests (one of which was likely to be a pole test). Therefore, manufacturers would optimise their test results for these one or two tests to achieve good EuroNCAP results. Mr Lowne suggested a modelling exercise to investigate what happens to injury values for all sizes, when optimising safety for a particular size. Mr Dalmotas again expressed his desire for a small dummy in the rear. Japan had no resolution on the small female dummy in the rear seating position. Mr Uchimura realised that 'best compromise' test conditions would need to be chosen to simulate the field data, however, at this time there was insufficient evidence for a 5th percentile female dummy in the rear seat. Mr Dalmotas proposed that if there were 2 tests, there would be an opportunity to use 2 different dummies in the same seating location in different tests. He proposed the use of a 50th percentile male driver

for a pole test, and a 5th percentile female driver for an MDB test. This is supported by accident data.

It was agreed to modify slide 4 by deleting 'MDB Crash Test' and references to seating positions.

- Slide 5 :- Delete ground clearance values (but note that it is an important parameter). Minimum 300mm ground clearance. Maximum ??? (to be decided).
Delete "height" and replace with "overall dimensions of MDB based on vehicle front-end characteristics".
Delete "Representation in Europe" and replace with "Representative Striking Vehicle(s)".

- Slide 6 :- Mr Lowne stated that Europe generally see greater deformation in vehicles in the field than in tests. This may be due to trolley mass, MDB face size, stiffness or speed.
Mr Hultman replied that high speed crashes are probably more severe, but that the majority of side impact crashes would be at lower speeds.
Mr Kaniyanthra and Mr Seyer pointed out that current side impact regulatory tests are conducted at 50 km/h and that a lower test speed would be unlikely to be accepted.
Mr Lowne noted that according to the study presented at the last meeting (Document SIWG 19), a speed of 50 km/h accounted for less than half of the crashes.
Mr Hultman expressed an unwillingness to agree to a test speed greater than 50 km/h, but offered to accept 50 km/h as a minimum.
After a short discussion it was agreed to amend the speed to be 50 to 60 km/h.

Mr Dalmotas was of the opinion that a crabbed MDB was necessary to exercise the rear dummy, but he agreed that ECE R95 is more injurious to the driver than FMVSS 214.

There was agreement for a crabbed MDB and this point remained unchanged.

Regarding centring of the barrier face on the R-Point, Mr Kaniyanthra wished to engage the A-Pillar instead, claiming that this matched the crash data.

Mr Lowne pointed out that higher injuries should be achieved by not engaging the A-pillar, and that the crash data should show a random distribution of impact points.

Mr Dalmotas suggested that aiming at the A-pillar would maximise leg injuries.

There was some further discussion on this point, without resolution. It was agreed that further tests would be needed to evaluate this issue. The text on slide 6 was revised to read "Barrier face centring?" and to be further considered in due course.

The issue of seat track position was also unresolved and discussion of this item postponed, although Mr Dalmotas stated that the seat is very rarely in mid-position in real world crashes.

- Slide 7 :- There was no consensus on this slide. It was not modified and discussion was postponed for a further meeting.
- Slide 8 :- Agreed. No change.
- Slide 9 :- Agreed. No change.
- Slide 10 :- Mr Kanianthra disagreed with targeting the head for pole testing, because NHTSA tests using SID-H3 had not shown any chest loading. Mr Seyer thought that this was inconsistent with common sense and was not an expected outcome.
It was agreed to add a statement "Ensure thoracic loading".
- Slide 11 :- There was no consensus on this slide. It was not modified and discussion was postponed for a further meeting.
- Slide 12 :- Mr Kanianthra remarked that NHTSA have decided that ISO OOP is not sufficient.
It was agreed to amend this slide to delete references to dummies and positions and to insert the statement "Examine ISO TR14933 and NHTSA/TC reports"

Slides 13 and 14 were not relevant for this discussion as they are related to a different topic.

TEST RESULTS AND PROPOSED TEST MATRICES

TRANSPORT CANADA

Mr Dalmotas presented results from out-of-position side airbag tests (Document SIWG 40). The results showed a significant difference in the responses of the Hybrid III 3 year old and Q3 dummies.

Mr Dalmotas also presented a copy of the Transport Canada out of position recommendation to the International Standards Organisation "Proposed Positioning Modifications to ISO Technical Report 14933 (Document SIWG 41). He also presented some information from the NHTSA/Transport Canada test series (Document SIWG 42).

AUSTRALIA

Mr Newland presented preliminary results from the first five tests of the FORS/TRANSPORT CANADA parametric test series. These results showed that the AFL Progress ECE R95 element collapsed under shear load when used on a

crabbed trolley. The height of the element from the ground was shown to be the parameter with the most significant effect on injury outcome.

NHTSA

Mr Kianianthra informed the group that NHTSA had conducted side airbag out of position tests on the Volvo S70 and Mercedes E Class. NHTSA were suggesting threshold values based on FMVSS208 proposals for the 3 year old child dummy. These values are the 36ms HIC of 900 (NHTSA) and 15 ms HIC of 570 (AAMA). NHTSA have also investigated 28 cases of side airbag deployment. There is evidence of adult lives saved and protection offered to the thorax.

EEVC

Mr Lowne presented a rationale for a test matrix to be undertaken by the IHRA Side Impact Working Group (Document SIWG 43).

Mr Kianianthra did not disagree with the objective of the proposal, however, he believed that a more elaborate test matrix would be required. He expressed concern that limited data may be dangerous and lead to incorrect conclusions too quickly. He also inquired as to the reasons for selecting the Ford Mondeo for testing.

Mr Lowne replied that it was a common vehicle on both sides of the Atlantic and was a relatively new design. Mr Hultman stated that the Mondeo is not sold in North America. A derivate, however, is sold (Contour/Mystique).

Mr Kianianthra also asked how we would know that vehicles 'approved to European standards only' do not have any design features for FMVSS 214 and vice-versa.

NHTSA

Mr Kianianthra presented the NHTSA side impact research test matrix for the fiscal year 99-2000 (Document SIWG 45).

Mr Dalmotas said he was surprised that NHTSA planned to conduct tests using the SIDIIIs with the seat in mid and rear position as these seemed unrealistic. He further commented that MPV and pole tests should both expose the driver to head injury. He added that Transport Canada would conduct tests to supplement and complement the NHTSA out of position side airbag tests.

EEVC

The EEVC are investigating the effect of test speed on "good performing" EuroNCAP cars. The EEVC have concluded that there is no justification for amending the requirement for height of the ECE R95 side impact barrier face. The ground clearance is currently set at 300mm. This may move up in future, but the top height of the barrier would not be changed.

Mr Kianianthra said that the US did not see this and gave an example of the Ford Excursion, which has a very high hood line.

Mr Lowne was requested to obtain EEVC comments on the IHRA Test Strawman with suggestions of possible tests to address deficiencies in information. Mr Newland to supply Mr Lowne with an updated version of the Test Strawman to be discussed by the EEVC.

JAMA were also requested to develop comments on the Test Strawman and to assess the possibility of JAMA tests to address deficiencies in the information.

Mr Lowne commented that there was a need to reassess the stiffness and stiffness distribution of vehicles for barrier design. He suggested load cell barrier tests for this purpose. He stated that the ECE R95 barrier was designed based on vehicles from the 1960s and 1970s with in-line engines, whereas modern cars tend to have transverse engines. He suggested that in-line engines may represent a worst case, thereby allowing continued use of the current barrier, particularly since the fleet still comprised some in-line engines, but this should be scientifically determined.

Mr Kianianthra said that NHTSA have a load cell barrier with a 9x4 array. They have tested 6 vehicles with the load cell wall and have finite element models for each of these.

Delegates were requested to bring load cell wall data to the next meeting.

Mr Lowne proposed interaction with the IHRA compatibility Working Group would be appropriate now. Mr Seyer suggested he could table the Test Strawman at the next IHRA Compatibility meeting.

EUROSID-2 UPDATE

Mr Lowne provided a brief comment on the status and progress of EuroSID-2. The EEVC and NHTSA were making efforts to correct some apparent anomalies with EuroSID-1, with a view to using EuroSID-2 in FMVSS 214 or a new regulation. The target date for evaluation of EuroSID-2 was October/November 1999, with NHTSA to complete evaluation by June 2000. Both US and European industry and governments were intending to participate in the evaluation program. This opens the possibility for short-term harmonisation. Japan was also keen for short-term harmonisation and willing to participate in testing.

REPORT TO THE IHRA STEERING COMMITTEE

The Chairman has an obligation to report to the IHRA Steering Committee. Delegates were keen to review a draft report. Mr Seyer undertook to distribute a draft report to members within the next week, with members to provide comments within one additional week.

NEXT MEETING OF IHRA SIDE IMPACT WORKING GROUP

It was agreed to hold the next meeting of the working group in conjunction with meetings of the IHRA Advanced Offset Frontal, Compatibility and Biomechanics Working Groups in Germany. The next Side Impact Working Group meeting was scheduled for 15 July 1999 in Cologne, Germany, but later changed to ACTS near Frankfurt, Germany on the same date.

The IHRA Side Impact Working Group also agreed to meet on 03-04 November 1999 in San Diego, following the Stapp conference.

MEETING CLOSED.

CRAIG NEWLAND
06 October 1999